Endocrinology



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Endocrinology

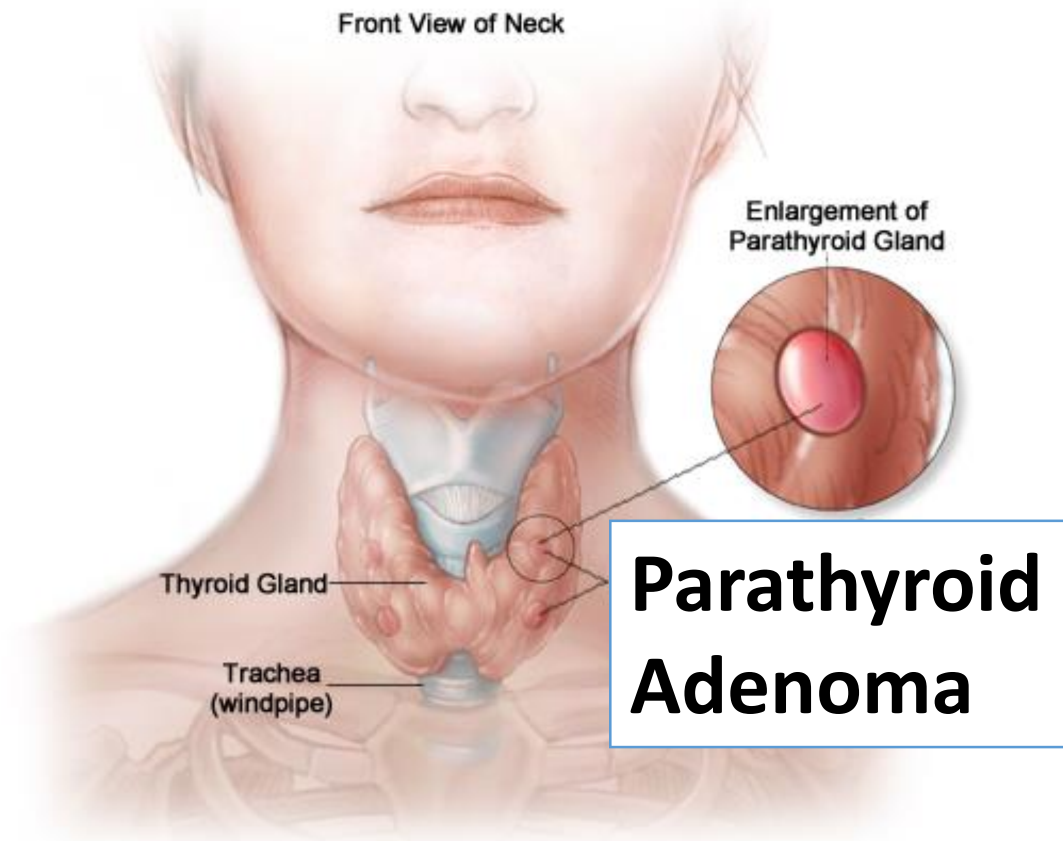
Hyperparathyroidism



Definition

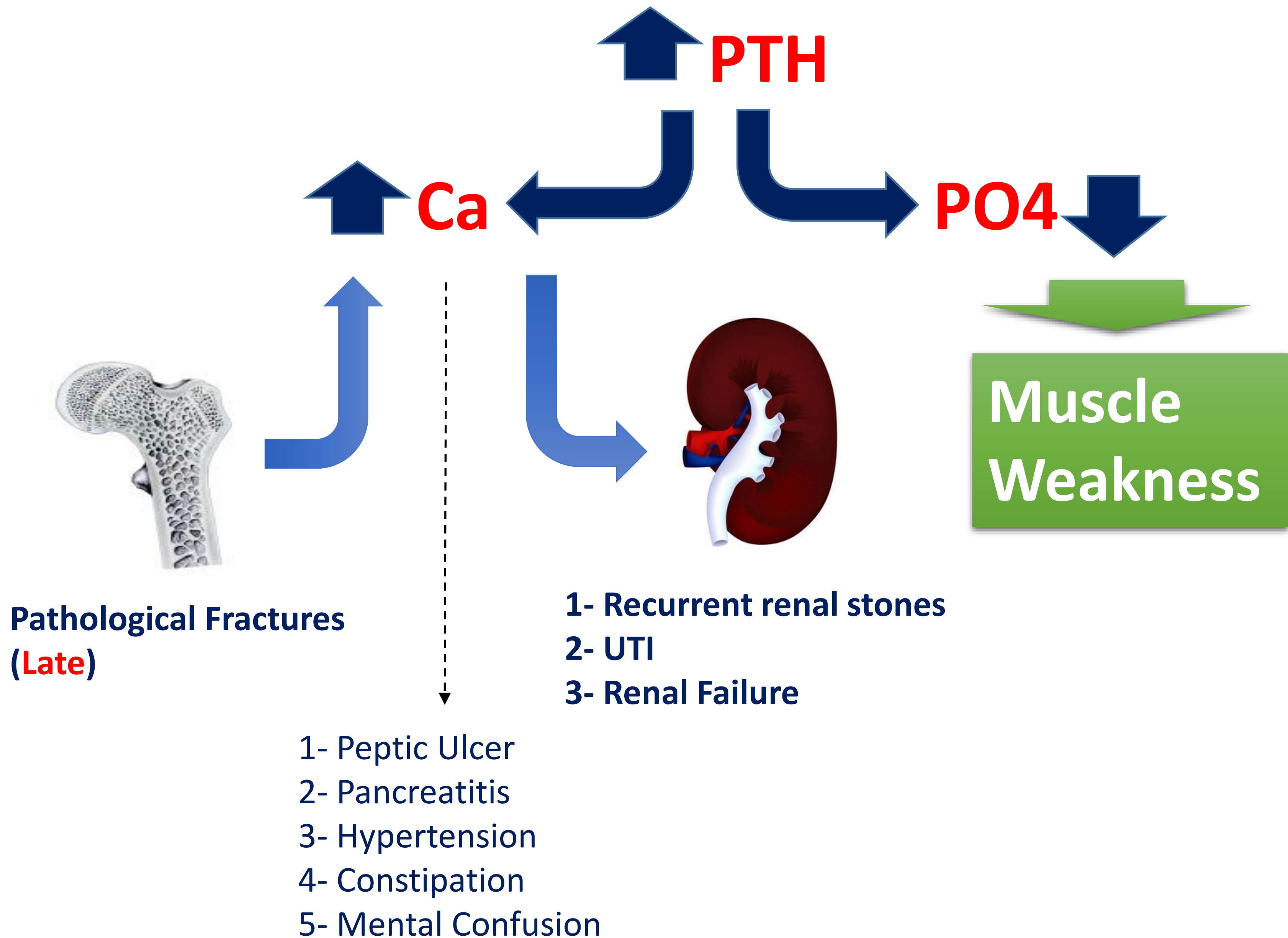
↑ PTH

Aetiology

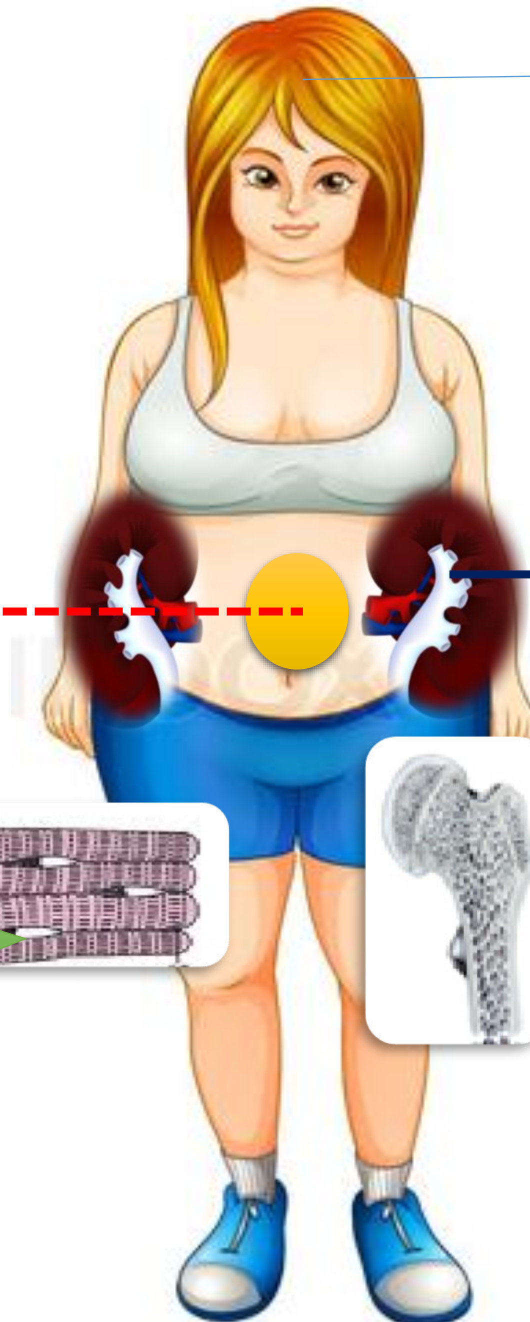


Parathyroid Adenoma

Pathogenesis



Clinical Picture



Mental Confusion

Abdominal Pain due to
Peptic Ulcer
Pancreatitis

1- Recurrent renal stones
2- UTI
3- Renal Failure

Pathological Fractures (Late)

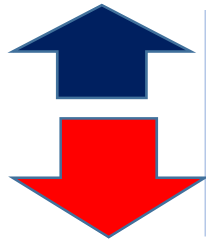
Muscle Weakness

Special Investigations

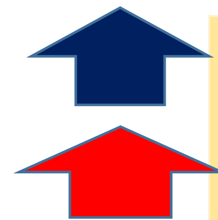








Serum Calcium
Serum PO4



Urine Calcium
Urine PO4



SAP

Special Investigations





Treatment



Surgical Removal of the Adenoma

Notes

①If Renal failure developed, Serum Phosphate may rise again (due to accumulation)

②Avoid Digitalis as high serum calcium increases its toxicity (use beta blockers if the patient developed arrhythmias)

③If you find a neck mass in patients with hyperparathyroidism it is more likely a co-associated Thyroid Adenoma

④ Medical treatment of Emergency Hypercalcemia include



❶ IV Saline
❷ Calcium restriction
❸ Loop Diuretics

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Hypoparathyroidism



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Definition

↓ PTH

Aetiology

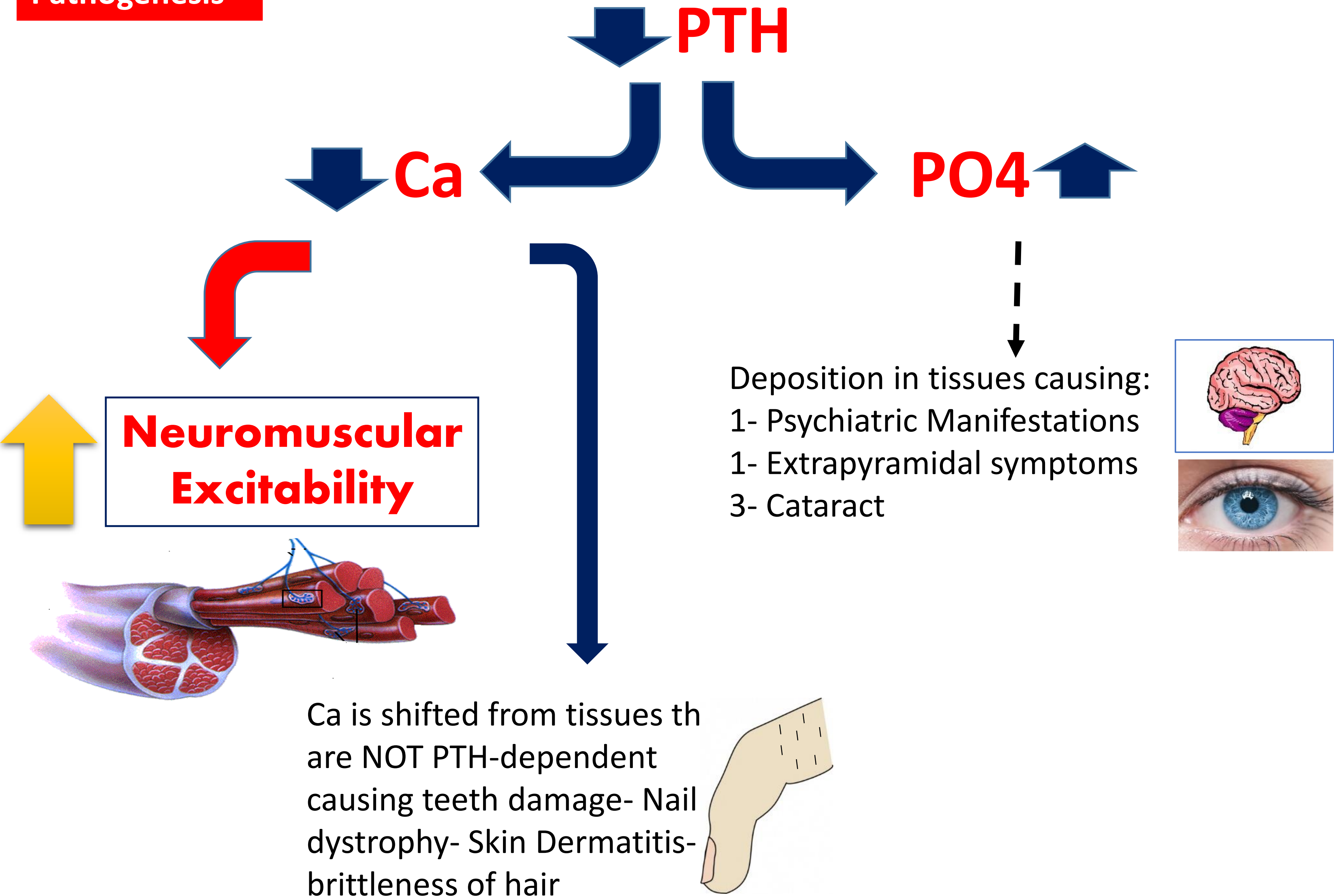
❶ **Surgical removal of the PTGs (Most commonly after Thyroidectomy)**

❷ **Autoimmune destruction of the gland**

❸ **Di George Syndrome (associated with *Thymic Aplasia*)**

❹ **Severe ↓ Mg (as Mg is needed for the action of the PTH)**

Pathogenesis



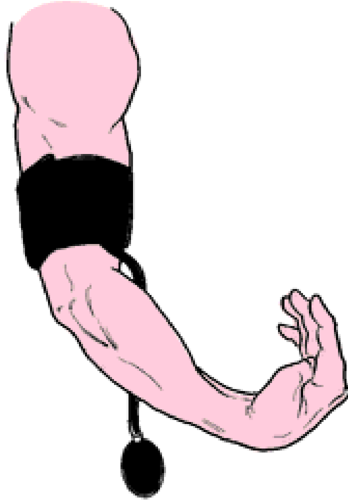
Manifest Tetany





1. Numbness and tingling
2. Carpopedal spasm
3. Laryngeal spasm
4. Convulsions

Trousseau sign



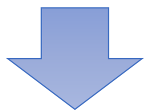
Elevating the pressure of the sphygmomanometer above systolic pressure for more than 2 minutes causes carpal spasm

Chvostek sign

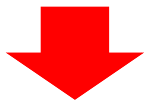


Tapping the facial nerve can cause contraction of fascial muscles

Special Investigations



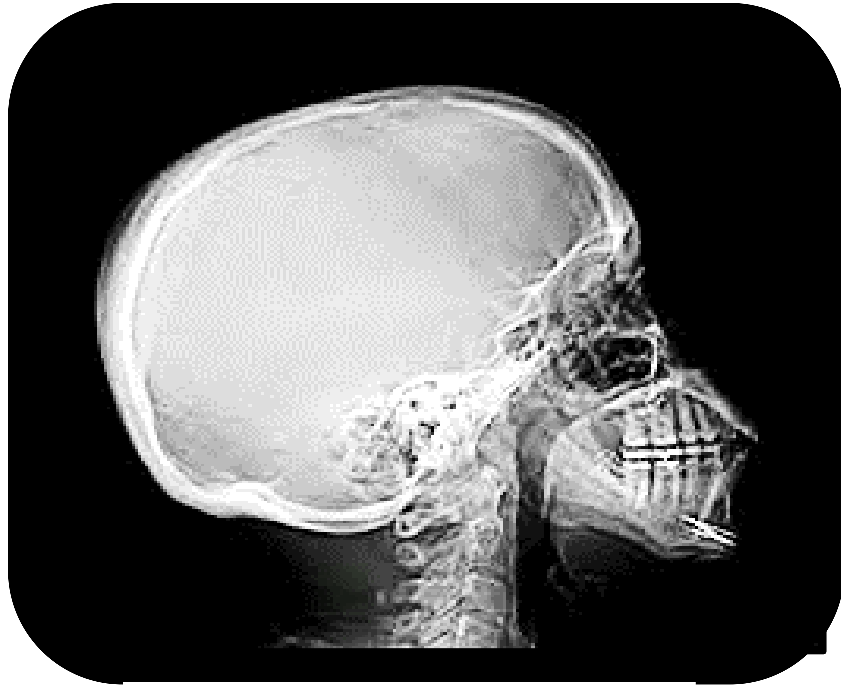
PTH



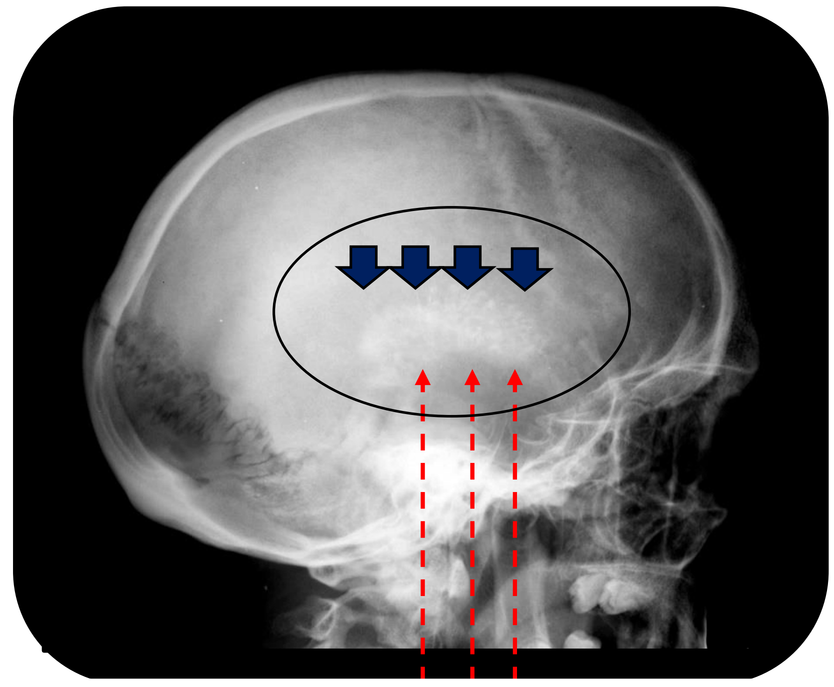
Serum Calcium



Serum PO4



Normal Skull X-Ray



Brain Calcification on Skull X-Ray

Treatment

1. **High dose Ca and Vitamin D** (Monitor Serum Ca to avoid Nephrocalsinosis)
2. Correct **Emergency Hypocalcemia**

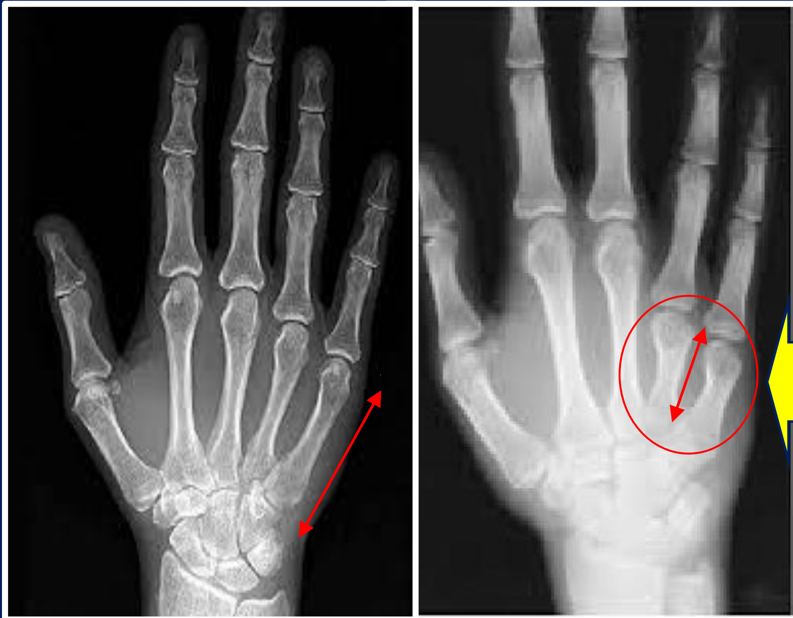
Clear airway- IV Ca gluconate VERY SLOWLY - Mg infusion (especially if Mg deficiency is expected as in Alcoholics)

3. Avoid Furosemide (as it increases Ca excretion in Urine and thus may aggravate the hypocalcemia)
4. Thiazide Diuretics ?!

Pseudohypoparathyroidism

1- Lack of response to PTH due to Receptor Defect
2- Associated with ↑ PTH
3- Associated with Short Metacarpals & Metatarsals
4- Exogenous PTH injection does not increase c-AMP excretion in Urine (Unlike Hypoparathyroidism)
5- ttt is by Ca + Vitamin D





Endocrinology

Cushing Syndrome



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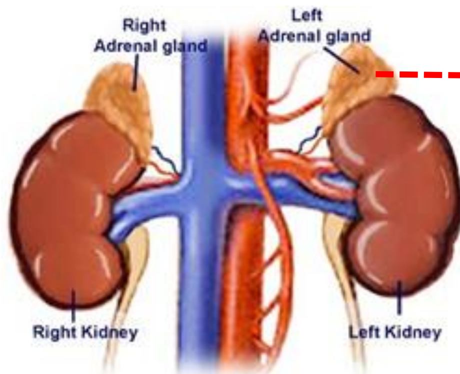


Glucocorticoids

Aetiology



ACTH (Cushing disease)



Adrenal Adenoma

Adrenal Carcinoma

Ectopic Production

Corticosteroids

Iatrogenic

Pathogenesis

Effects of Cortisone

CHO  Anti-Insulin  DM

Fat  Redistribution  Moon Face and Buffalo body

Protein  Catabolic Effect  Bruises of the skin

Water and Minerals 

1-Na and Water Reabsorption
2- Increase K excretion
3- Negative Ca balance



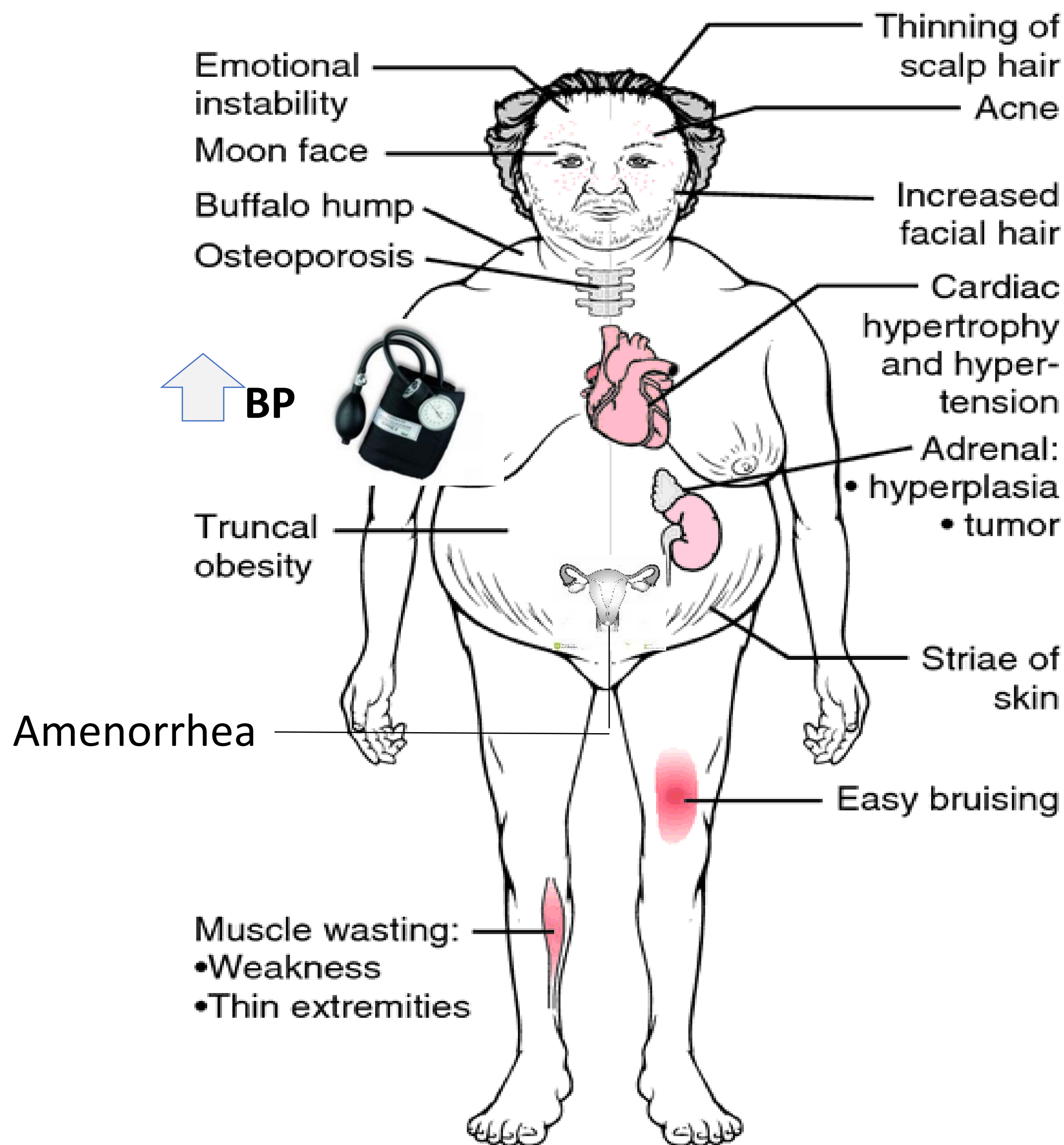
↑↑↑ BP
Hypokalemia
Osteoporosis

Blood 

↑ RBCs
Neutrophils

↓ Lymphocytes
Eosinophils

Clinical Picture



Special Investigations

1

1- High serum cortisol
2- DM
3- Blood picture
4- Increase Urinary 24 Free Cortisol Excretion

2

DMST → Failure to suppress glucocorticoid production with 1 mg Dexamethasone

3

ACTH

↑ **Cushing Disease** (Suppressible by High Dose-DMST 4mg)

Ectopic ACTH production (Non Suppressible)

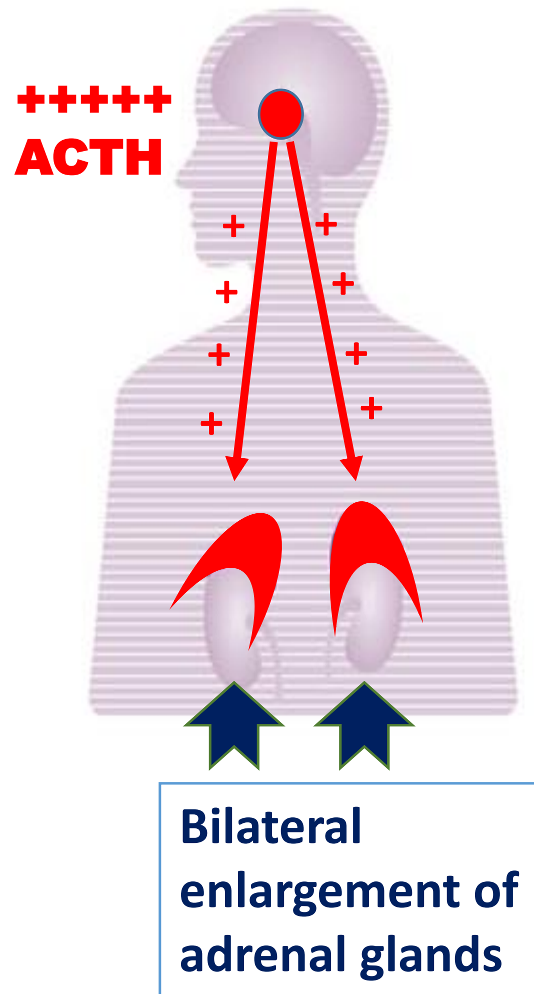
↓ **Adrenal Adenoma** (Only Cortical)

Adrenal Carcinoma (Secrets different Steroids)

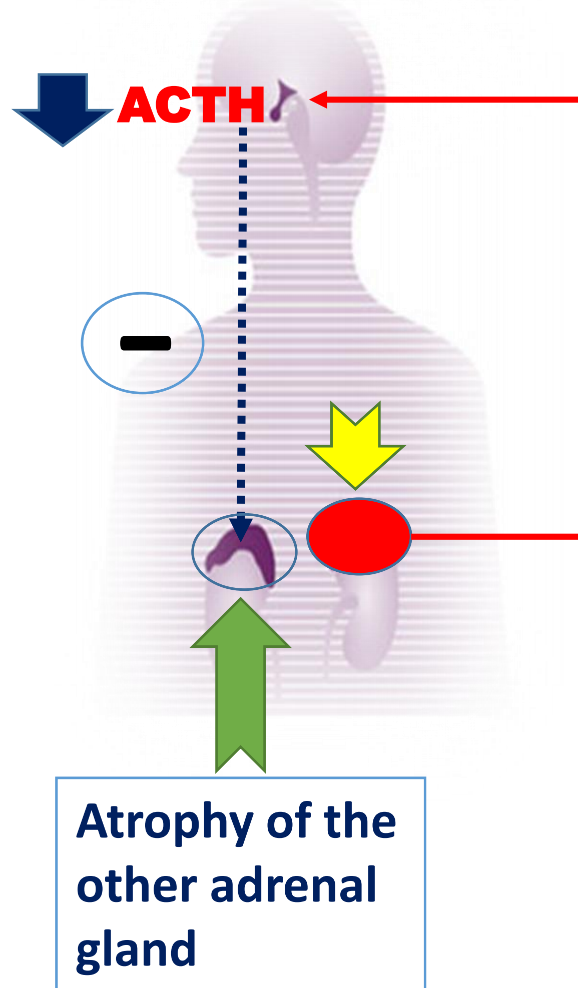
Special Investigations

Cushing Disease

Adrenal Adenoma



Bilateral enlargement of adrenal glands



Atrophy of the other adrenal gland

Surgery

Endocrinology

Primary Hyperaldosteronism
Conn's Syndrome



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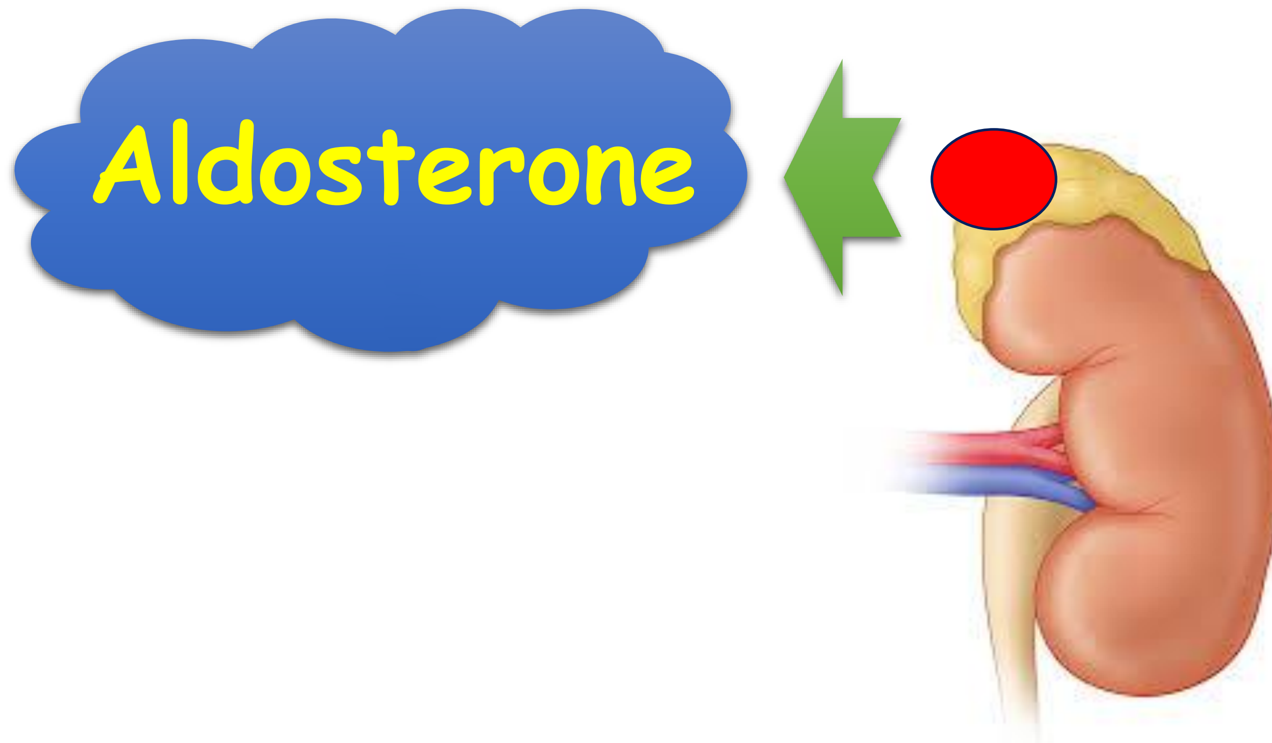
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Definition



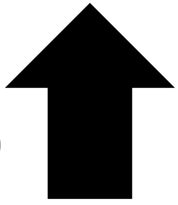
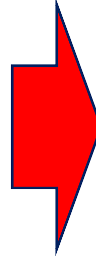
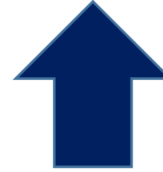
Aldosterone

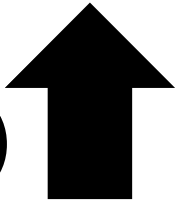
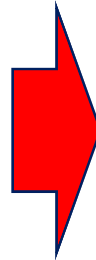
Aetiology

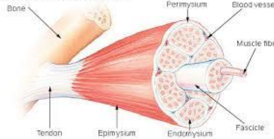


Pathogenesis

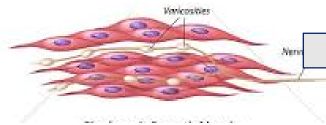
Effects of Aldosterone

❶  Na and Water Reabsorption   Blood Pressure

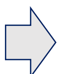
❷  K excretion   K



 Weakness



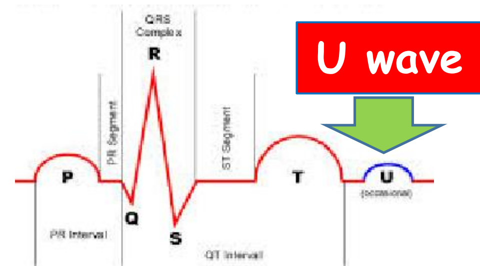
 Constipation

  Arrhythmias

Clinical Picture

↑ BP





U wave

Arrhythmias

Constipation

Weakness

Polyuria

As hypokalemia impedes ADH action

No Odema

Special Investigations

1  **Aldosterone**

BUT No Response to postural changes (Unlike Bilateral Adrenal Hyperplasia)

Bilateral Adrenal Hyperplasia:
1- Increase sensitivity of Ang II Receptors
2- Respond to prolonged upright posture
3- Treatment by Antihypertensive drugs

2  **K**

3 **Alkalosis**

4 **Decreased Plasma Renin Activity**

2ry Hyperaldostrenism

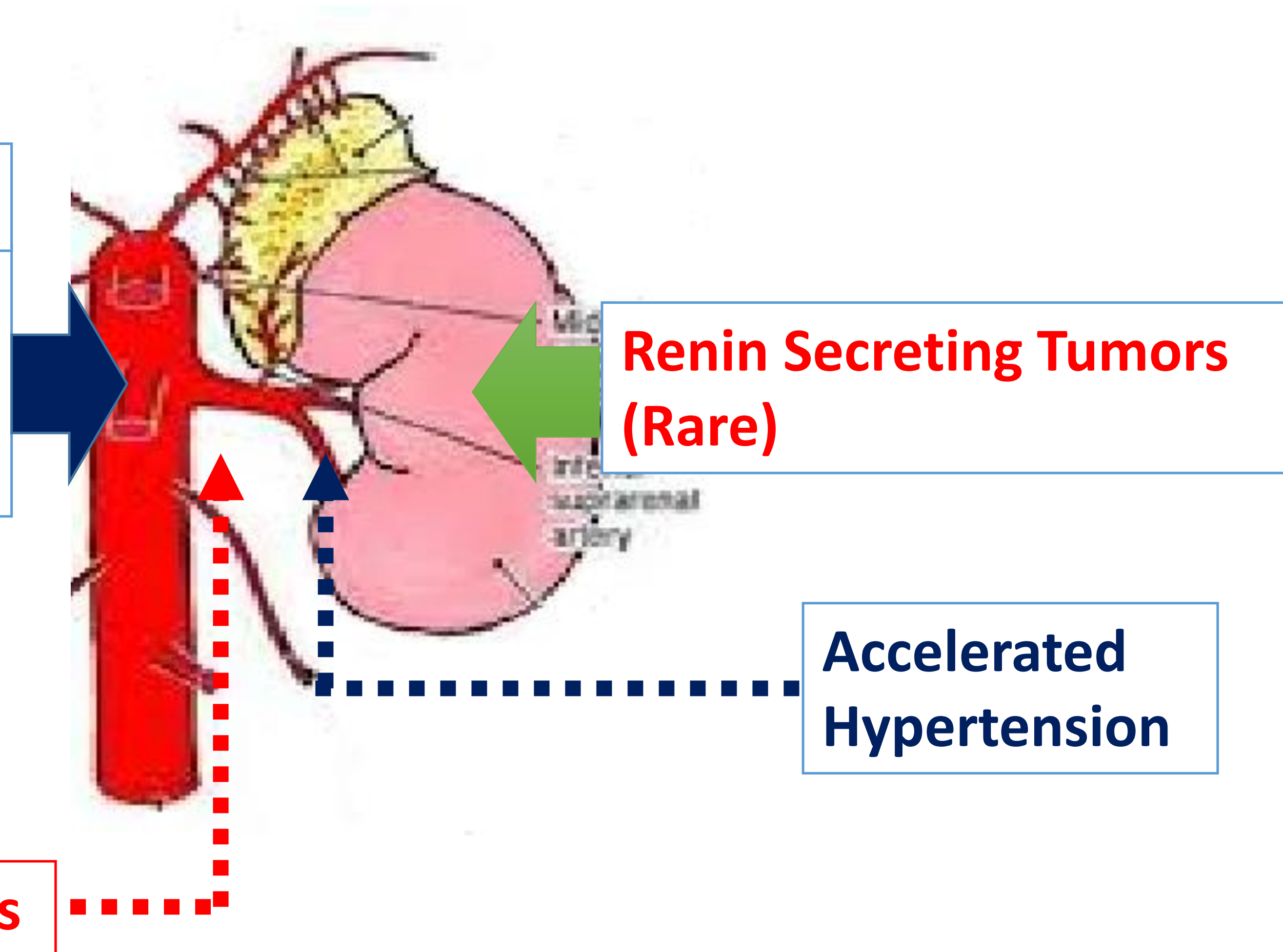
Decrease ECPV

(Developing Oedema)

1- Heart Failure

2- LCF

3- Nephrotic Syndrome



Renin Secreting Tumors (Rare)

Accelerated Hypertension

Renal Artery Stenosis

Likely caused by Atheroma

Increased Plasma Renin Activity

Surgery

Endocrinology

Adrenocortical Insufficiency
(Addison Disease)



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Definition



Adrenal Hormones

1. Glucocorticoids
2. Mineralocorticoids
3. Adrenal Androgens

Aetiology

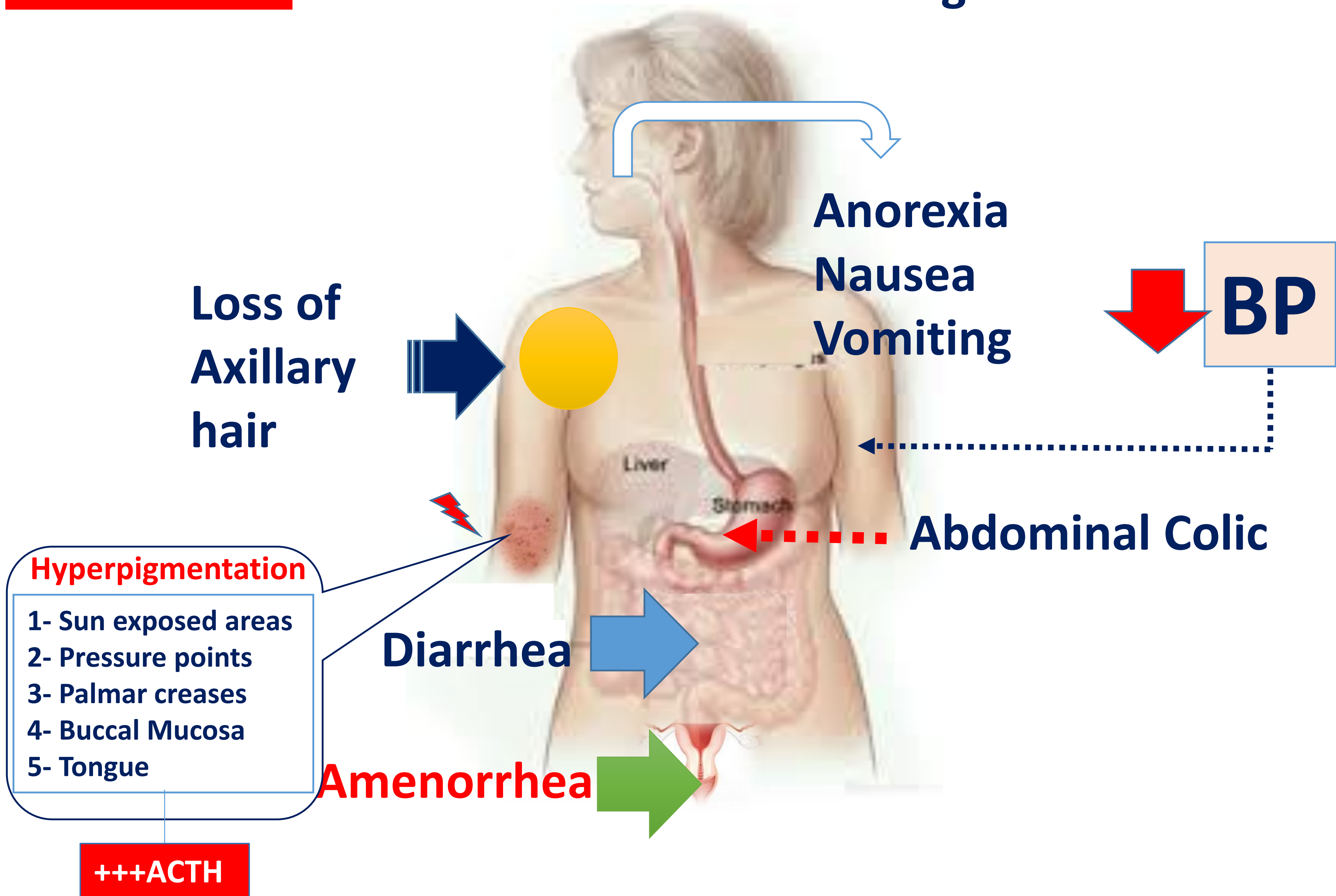
Autoimmune

TB

1- Autoimmune (Commonest cause in the West)
2- TB (Adrenal Calcification on Plain X-Ray)
3- Viral (AIDS)
4- Infiltration (Sarcoidosis)
5- Adrenal Metastasis (Lung Cancer)
6- Drugs Induced (Ketoconazole) as it inhibits Cytochrome P 450 in the adrenal glands
6- 2ry to ACTH deficiency

Pathogenesis

1. ↓ Cortisone
2. ↓ Aldosterone
3. ↓ Adrenal Androgens

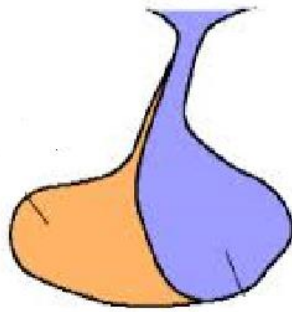


Clinical Picture
Weakness & Loss of Weight
Anorexia
Nausea
Vomiting
BP
Loss of Axillary hair
Liver
Stomach
Abdominal Colic
Hyperpigmentation
1- Sun exposed areas
2- Pressure points
3- Palmar creases
4- Buccal Mucosa
5- Tongue
Diarrhea
Amenorrhea
+++ACTH

Special Investigations

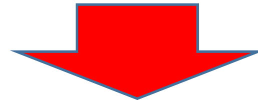
2

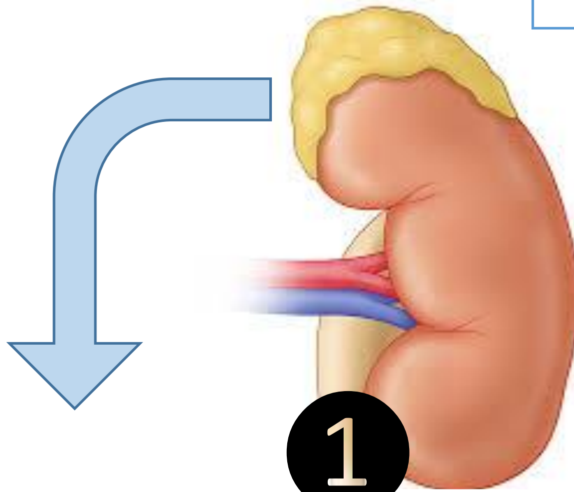
++++ ACTH (Except in 2ry cases)



3

Failure of ACTH stimulation test (in both 1ry and 2ry adrenal insufficiency)





+ + +

1



Serum Cortisol

Treatment

Replacement therapy for the deficient hormones:

1- Hydrocortisone

2- Fludrocortisone acetate





Adrenal Crisis

Precipitating Factors

❶ ++++++Stress (trauma-Infections-Accident) in patients with Addison disease.

❷ Sudden withdrawal of cortisone.

❸ Acute destruction (e.g. Hge due to anticoagulants).



① IV Hydrocortisone
② IV Fluids
③ Glucose to correct Hypoglycemia

1-Exaggerated ALL Manifestations (Low BP-Confusion- Colic)
2-Fever
3-Cyanosis & shock
4-Hyperpigmentation (except of acute from the start)

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Pheochromocytoma



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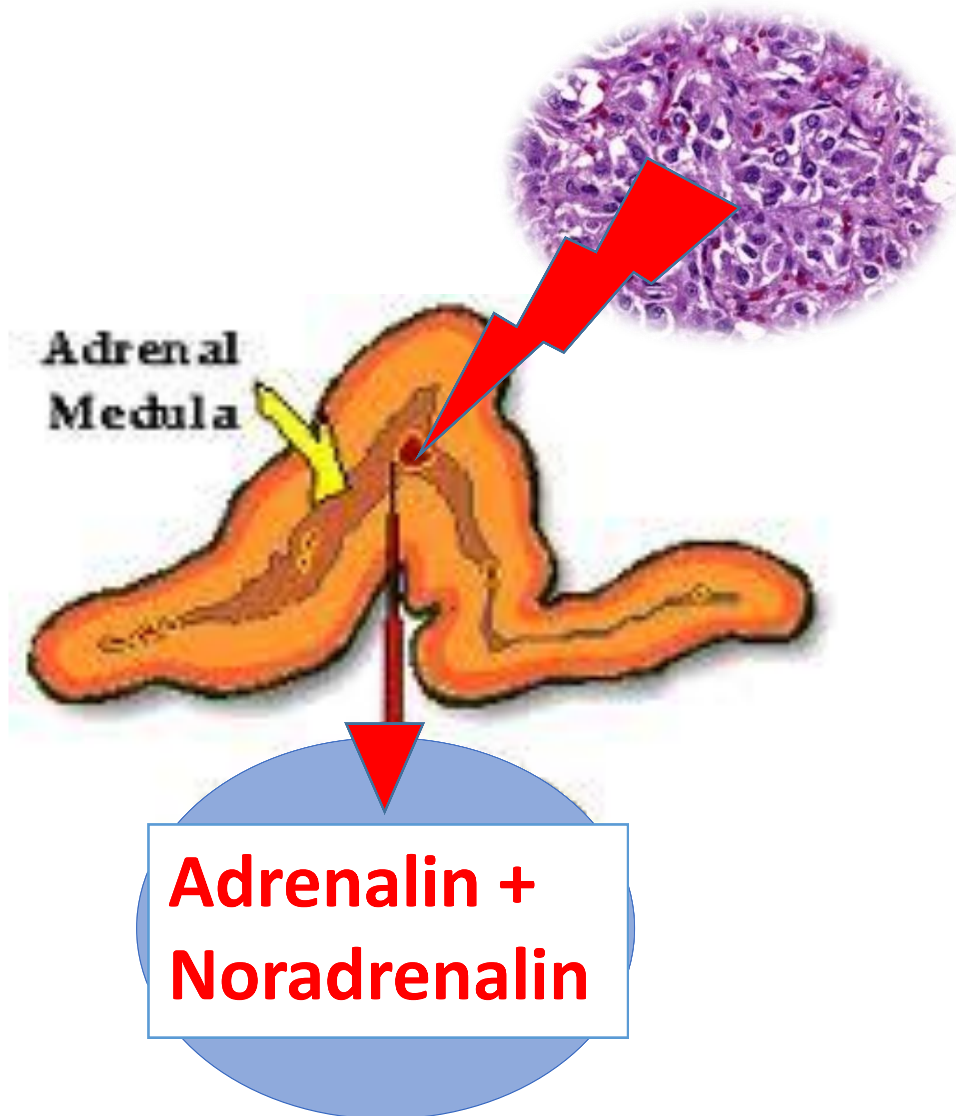
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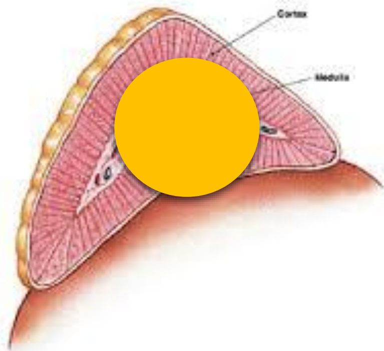


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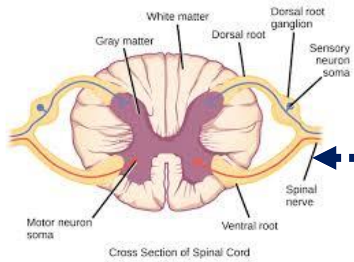
Definition



Aetiology



Adrenal Medulla



Sympathetic ganglia



Urinary bladder (Rare)

Clinical Picture

↑ BP

Anxiety

Headache

Hot Flushes

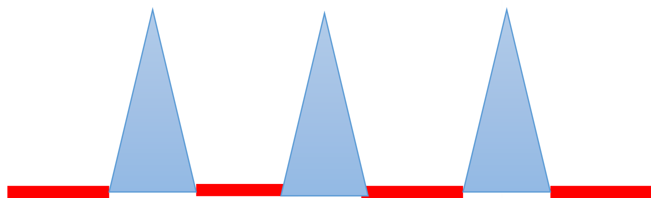
Sweating

Palpitations & Chest Pain

Abdominal Pains (due to VC of visceral blood vessels)

Tremors

?! Loss of Weight



Manifestations occur as attacks

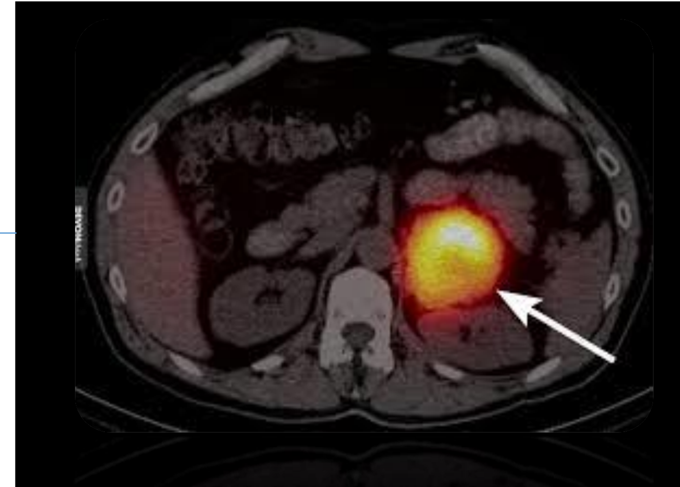
Precipitated by: Abdominal Examination- Defecation - Late Pregnancy- Emotional Stress- Drugs

Special Investigations

Urinary Catecholamine

VMA

Radiology to detect the site of the tumor



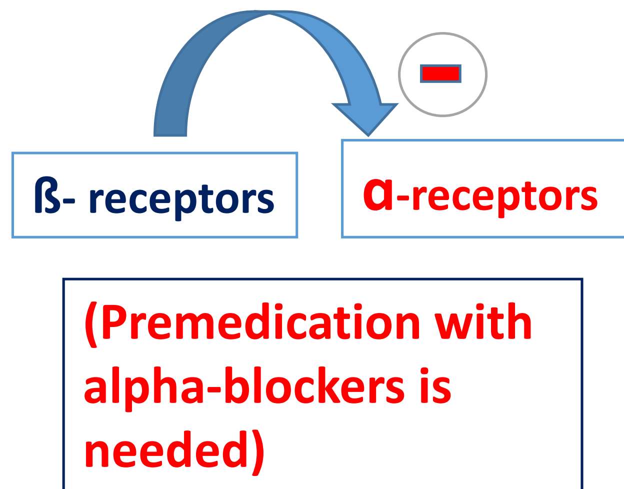
Treatment

1- Surgical Removal of the tumor (Avoid Atropine- Unexplained shock after surgery- Saline Infusion during surgery)

2- Control the Hypertension by α-blockers

3- Control the Palpitations by ß- blockers

NEVER give ß blockers alone



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Diabetes Insipidus



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Definition



Aetiology

❶ Primary (Idiopathic): Commonest type

❷ 2ry to PHP

❸ Vassoprissinase Induced (Late Pregnancy)

Clinical Picture

Polydipsia



1- Almost Always Nocturia
2- Abruptly
3- The patient likes cold water
4- Polyuria is NOT more than 18 Liters per day (unlike the psychogenic plidypsia)

Polyuria (with low SG)



Special Investigations

① Polyuria with low Specific Gravity



❶ Pituitary: Absent bright spot on MRI
❷ Psychogenic: ADH injection after dehydration does not increase Urine SG
❸ Nephrogenic: No Response to ADH Injection
(causes: TIN- +++Ca - ↓ K)

② Normal Response to ADH Injection



1-Decrease Urine Volume
2-Increase Specific Gravity

③ ↑ Uric Acid



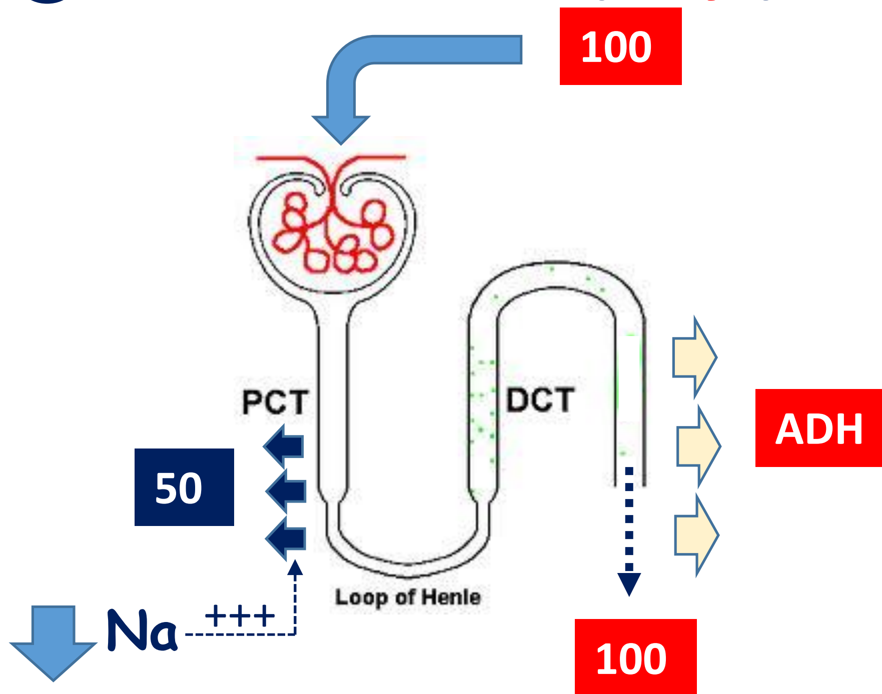
Due to decreased stimulation of V1 Receptors thus decreases uric acid clearance

Treatment

❶ **Replacement therapy e.g. by DDAVP (*Desmopressin Acetate)* Nasal Spray**



❷ **Thiazide Diuretics (Why?)**



❸ **Reduce any aggravating factor: e.g. Glucocorticoids as they increase free water excretion.**

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Hyperthyroidism



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Thyroid Disorders

Anatomical Classification



- Goitrous (Nodular/Smooth)
- Non Goitrous

Etiological Classification



- Autoimmune : Hashimoto thyroiditis
- Infection : Viral Thyroiditis
- Neoplastic: Cancer/Benign
- Nutritional: Iodine Deficiency

Functional classification



- Hyperfunction: Hyperthyroidism
- Normal function: Euthyroid
- Hypofunction: Hypothyroidism

Hyperthyroidism

Definition



Thyroxin Level

Aetiology

Gravis Disease

1- Most common cause
2- Strong familial tendency
3- Females
4- Diffuse enlargement of the gland
5- Caused by TSH Ab [Stim]
6- +++ Ophthalmopathy

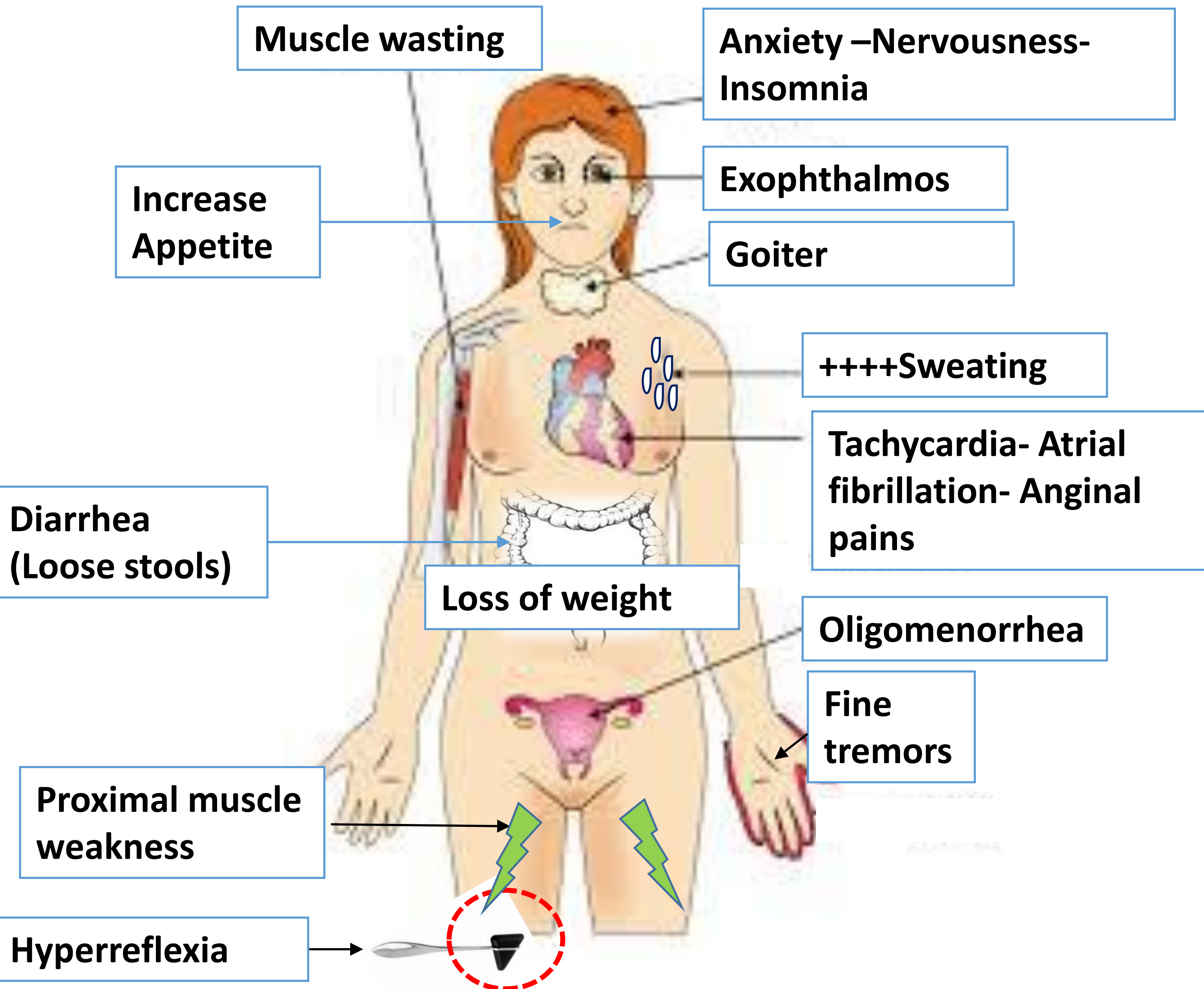
→ Proptosis



Other causes

- Toxic adenoma
- Toxic Multinodular goiter
- Increase intake of L-Thyroxin
- Amiodarone (Iodine component)
- Stroma Overii containing thyroid tissue
- Acute phase of thyroiditis (due to release of thyroxin)

Clinical Picture



Special Investigations



↑ **FT4I**

↑ **Free T4**

↓ **TSH**

↑ **TSH- R Ab [Stim]**
In Gravis Disease

- ✓ **RAI Uptake is increased in Gravis Disease and decreased in Subacute thyroiditis**
- ✓ **+++++ ESR in Subacute thyroiditis**

Treatment

Ablation of the Thyroid gland

1 Subtotal thyroidectomy

For Very Large or Multinodular goiter

2 Radioactive Iodine

Is the preferred treatment for patients more than 21 years old (avoid it in pregnant women as irradiation can affect the baby)

Anti-thyroid Drugs

3 PTU

1-Most useful in young with Small gland or mild disease 2-Associated with increase incidence of Recurrence
3-May cause Agranulocytosis



4 Methimazole

Less frequent doses are needed (More convenient 60 mg once daily)

Beta Blockers

To decrease the cardiac manifestations

Notes

Note 1

If progressive Exophthalmos in Gravis disease Give Prednisone (40-60 mg should be given promptly for several weeks [followed by gradual withdrawal])

Thyroid Crisis

Note 2

Can occur with +++stress- Operations for the thyroid gland- RAI
Exaggerated ALL manifestations (Marked delirium - +++Heart Rate -Vomiting – Diarrhea- and fever)
Treatment by:
1- PTU 250 mg/6 h (decreases peripheral conversion of T4)
2- Logol's Iodine 10 drops TDS Orally
3- Hydrocortisone 50 mg/6h
(**Avoid aspirin as it displaces T4 from TBG …+++T4 Levels**)

Note 3

If Acute hepatic necrosis may occur while using PTU…….ttt by Prednisone

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Hypothyroidism



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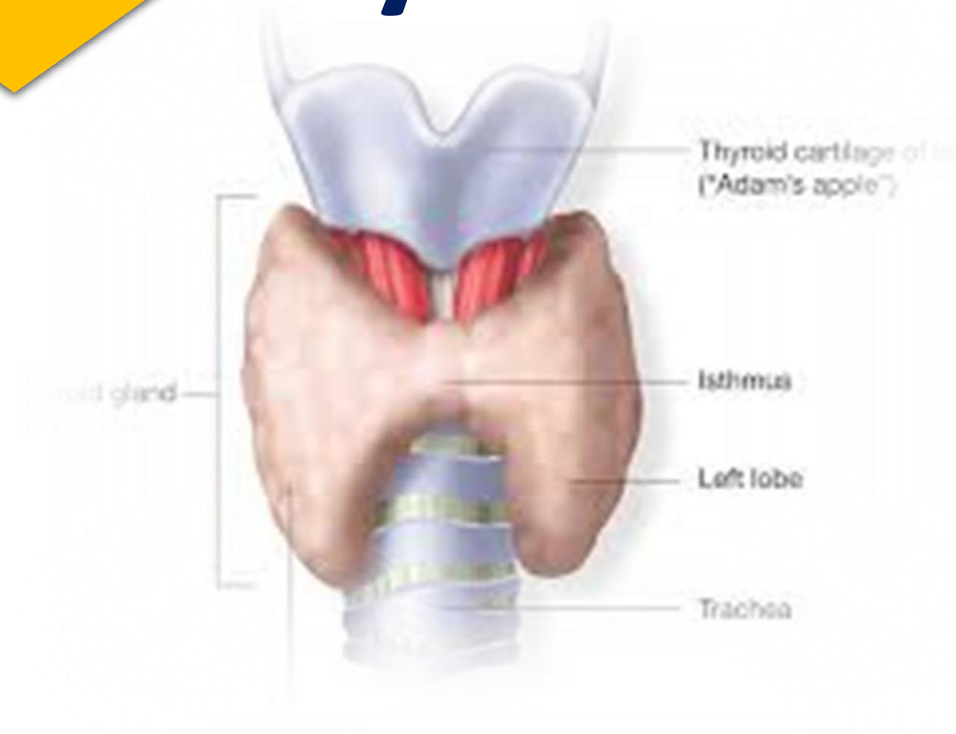
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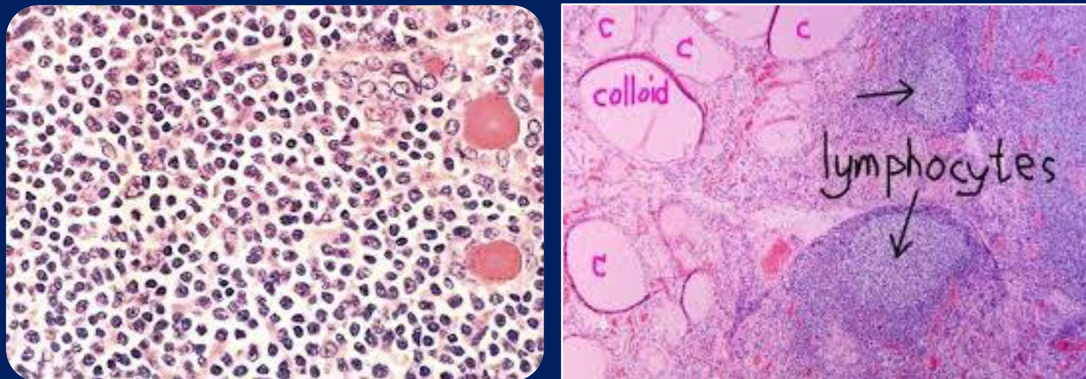
Thyroxin



Aetiology

Hashimoto Thyroiditis

1- The comment cause of hypothyroidism in the West
2- Associated with Antimicrosomal Antibodies
3- More common in females
4- Associated with other autoimmune conditions
5- Painless enlargement of the thyroid gland.



Other causes

- Iodine deficiency
- Congenital (Mental Retardation)
- Drug induced: ATDs-Amiodarone-Lithium
- Post surgical
- Post irradiation

Pathogenesis

Hypo-Metabolism

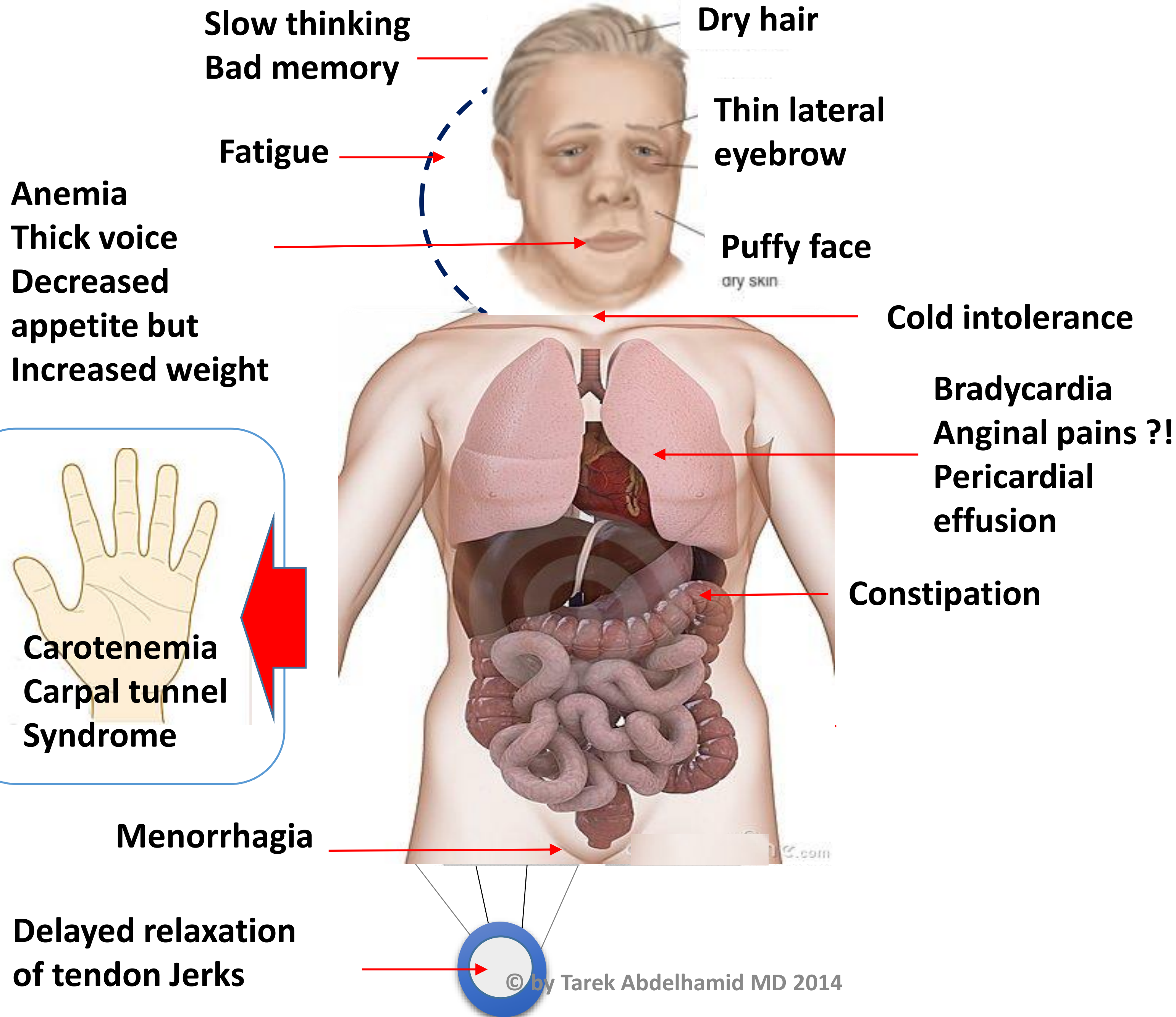
Mucopolysaccharides deposition

Increased Cholesterol

Anemia

Carotenemia

Clinical Picture



Special Investigations

↑ **TSH**

↓ **T4**

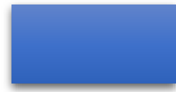
↓ **RAIU**

1- Increase Cholesterol
2- Low Sodium
3- Anemia

Anti-thyroglobulin and Anti-thyroperoxidase Abs

Treatment





Replacement therapy by Thyroxin (T4)





Thyroxin should be give gradually to avoid Anginal attacks

Important Note:

1- Bradycardia may decrease myocardial Oxygen needs thus prevents Anginal attacks.

2- Giving L-Thyroxin rapidly may increase the HR and precipitate Anginal attacks (Thyroxin should be give gradually to avoid Anginal attacks)

3-If Angina develops after the use of T4 ttt is by ATD e.g PTU as it blocks the action of L-Thyroxin on the heart)

Thyroxin should be give gradually to avoid Anginal attacks

Myxedema Coma

1. Caused by +++ deficiency of Thyroxin
2. It can be precipitated by: Infections–Stress–Cold– Drugs
3. Manifestations include

Severe Hypothermia
Hypoventilation (low O_2 + high CO_2)
Low Na
Convulsions

4. ttt by Thyroxin plus blankets

(Avoid active heating as ….► VD…► Shock)

Endocrinology

Acromegaly



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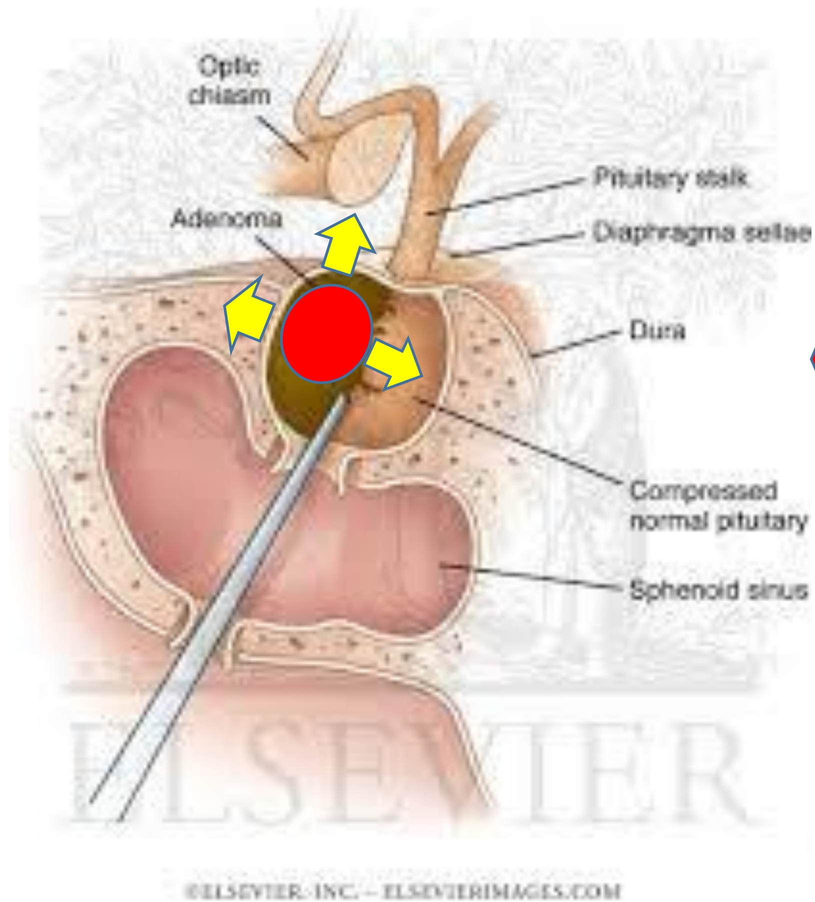
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Definition



Pathological increase in GH production by the pituitary gland.

Aetiology



Acidophil Adenoma

Clinical Picture

1 Growth of Bones → Big head- big hands- Big mandible

2 Growth of soft tissues →
1- Ears- Nose- tongue
2- Vocal cords….Deep voice
3- Sleep Apnea Syndrome
4- Cardiomegaly
5- Carpal tunnel syndrome
6- Gynecomastia

3 Metabolic →
Anti-Insulin …IRDM
?!Na Reabsorption…..Hypertension
↓PIF….+++ PROLACTIN…….Impotence

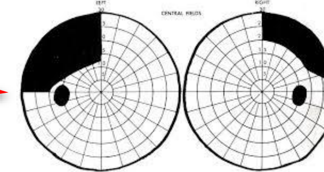
4 Local Pressure →
1- Headache
2- Bitemporal Hemianopia
3- PHP

5 Hypogonadism →
+++Prolactin
↓ GRH
PHP

Clinical Picture

Big Head

Headache



Bitemporal Hemianopia

↑ BP



Big Ears

Big nose

Sleep Apnea Syndrome

Deep voice

Diabetes Mellitus

CTS

Impotence

Big hands

Big foot

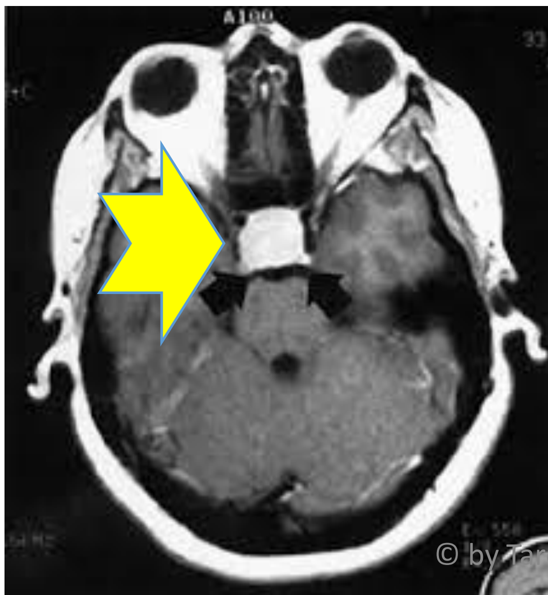
Osteoarthritis

Special Investigations

Failure to decrease GH by:

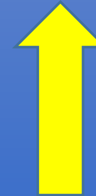
Glucose Suppression test.

Radiology





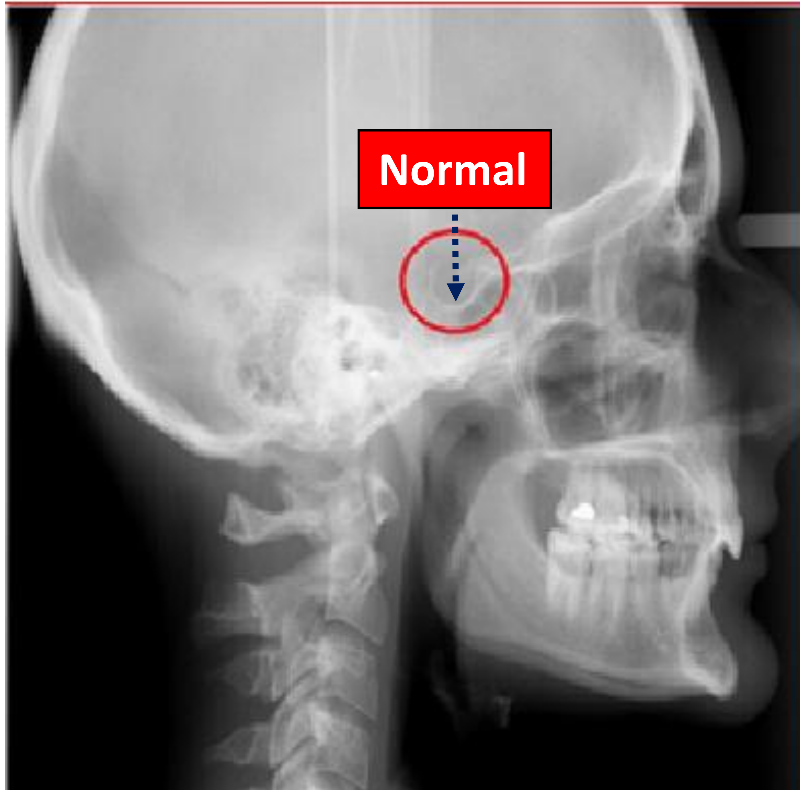
IGF-1

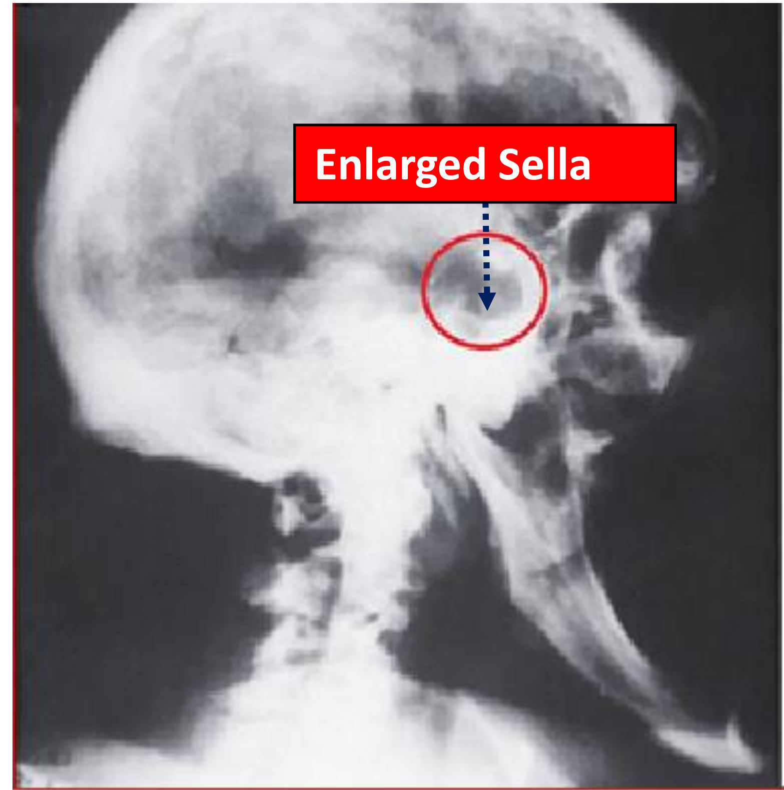


Serum PO4

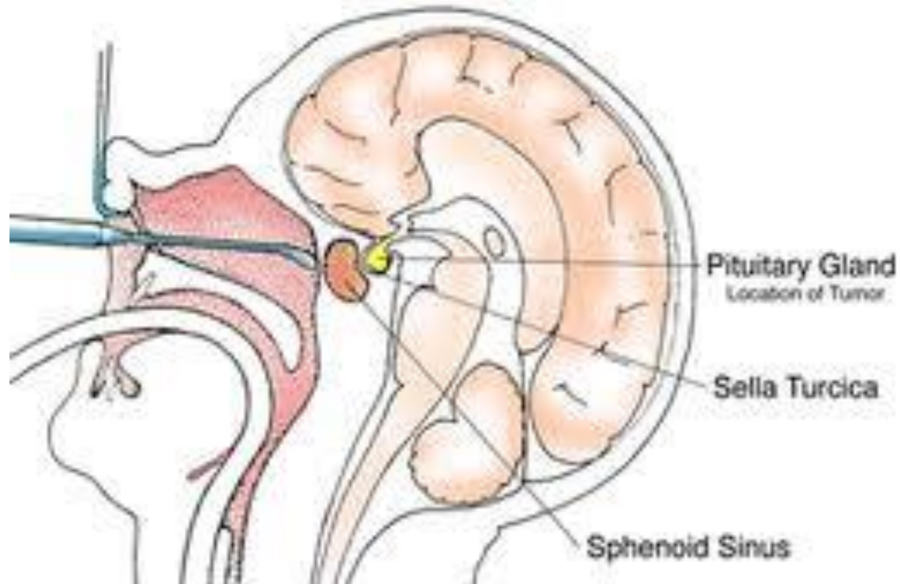
Associated Diabetes Mellitus

Special Investigations





Treatment



Transphenoidal microsurgery to remove the adenoma

Endocrinology

Panhypopituitarism



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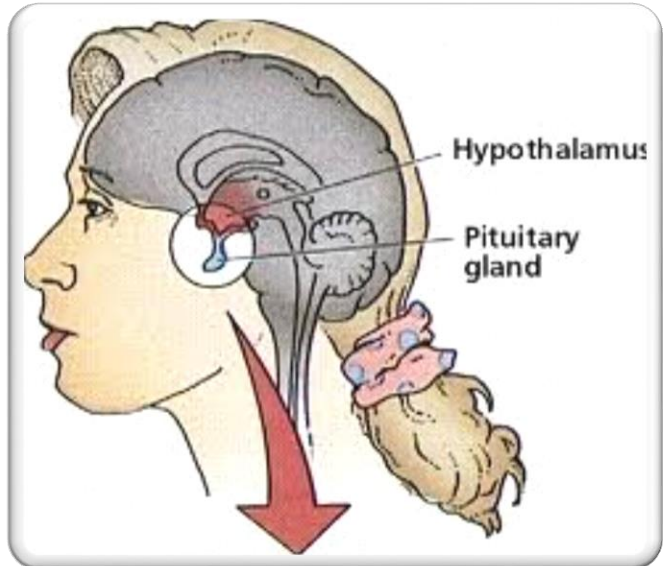
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Definition



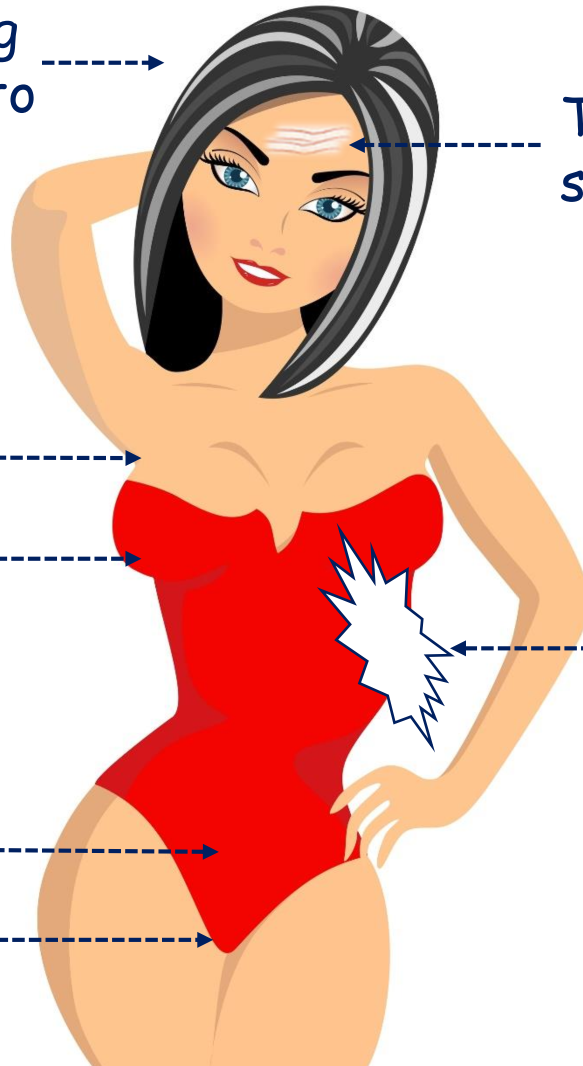
Pituitary Hormones

Aetiology



1-Traumatic (Surgical Removal)
2-Inflammatory (Encephalitis)
3-Neoplastic
4-Vascular (Post partum Hge)
5-Infiltrative (Hemochromatosis)
6-Immune (autoimmune)
7-Idiopathic

Clinical Picture



Special Investigations

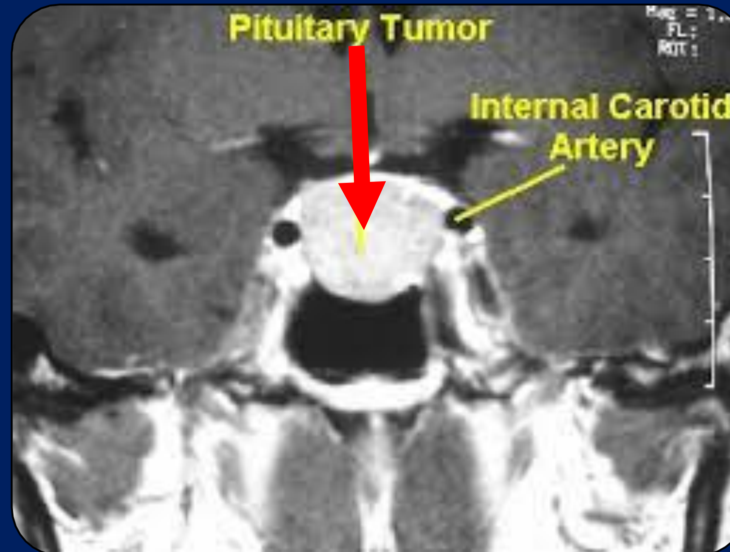
1

RIA to measure <u>Level</u> of Hormones

2

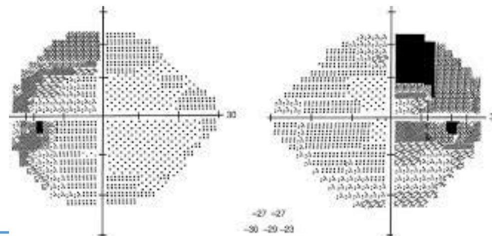
MRI

(to detect local pathology)



3

Visual field defects (if due to Pituitary tumor)



Treatment

Replacement therapy for the deficient hormones e.g. Cortisone–Thyroxin–and Sex hormones.



❶ **If polyuria appeared after starting cortisone therapy you should suspect underlying ADH deficiency.**

❷ **Never give Thyroxin before Cortisone.**

(Always give Cortisone BEFORE Thyroxin)

❸ **Loss of libido in females is treated by Testosterone while amenorrhea needs Estrogen + Progesterone.**

Endocrinology

Hypercalcaemia



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Causes of Hypercalcaemia

❶ 1ry Hyperparathyroidism

❷ Malignancy

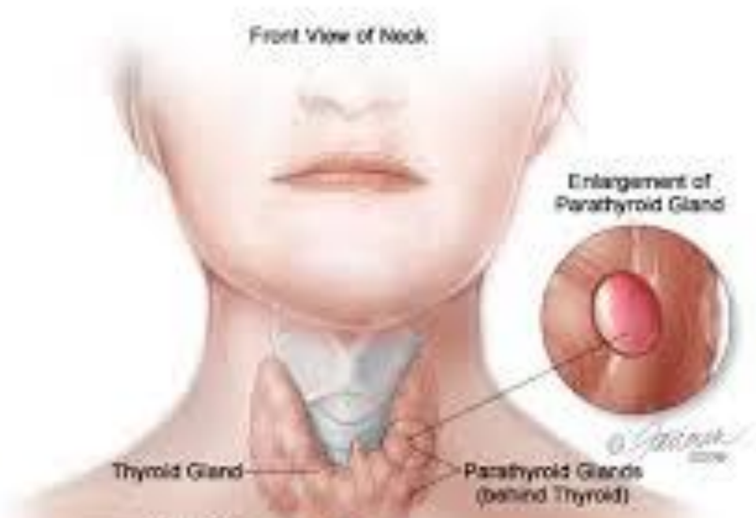
❸ Drug induced

❹ Endocrinal causes

❺ Granulomatous disorders

❻ Other Causes

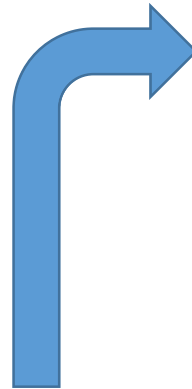
❶ 1ry Hyperparathyroidism



⬆ Ca	⬇ PO4	⬆ PTH

② Malignancy





❶ Weight Loss- Anemia-ESR ⇧

❷ NO history of recurrent renal stones

❸ SAP ++++++++

❹ PTH ⇩

1- PTH-RP
2- Vit D-Like Sterols
3- Local bone damage by OF-IL1-TNF

3 Drug induced





A- Vit A toxicity

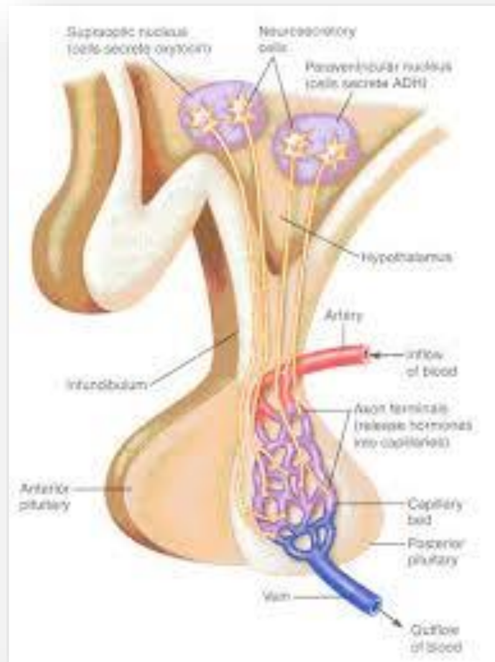
B- Psychotropic Drugs e.g. (Lithium)

C- Thiazide Diuretics

D- Vit D toxicity

❹ Endocrinal causes



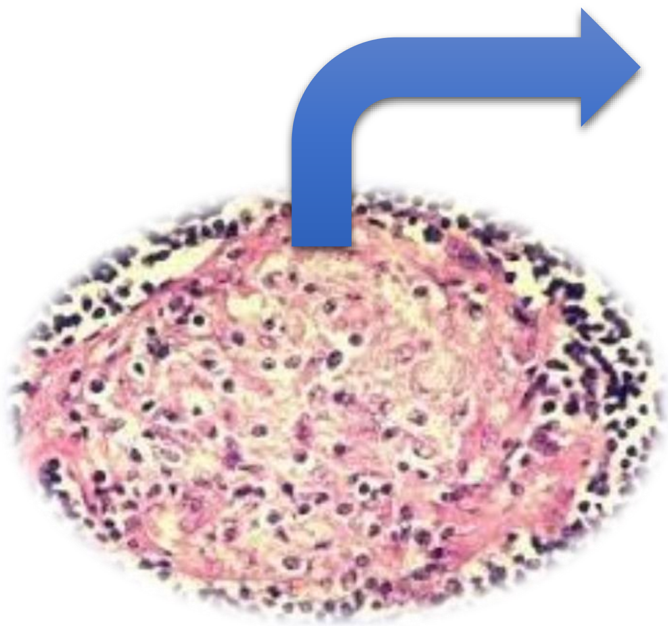


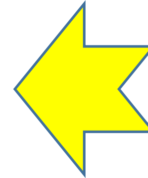
A- **Addison Disease**

B- **Pheochromocytoma**

C- **Thyrotoxicosis**

5 Granulomatous disorders





Ca

Sarcoidosis
Tuberculosis
Histoplasmosis

❻ Other Causes

❶ Prolonged Immobilization
❷ Recovery phase of acute Rhabdomyolysis
❸ FHH (Familial Hypocalciuric Hypercalcaemia)
❹ Aluminum Toxicity (Dialysis in CRF)

Endocrinology

Hypocalcaemia



تحذير هام

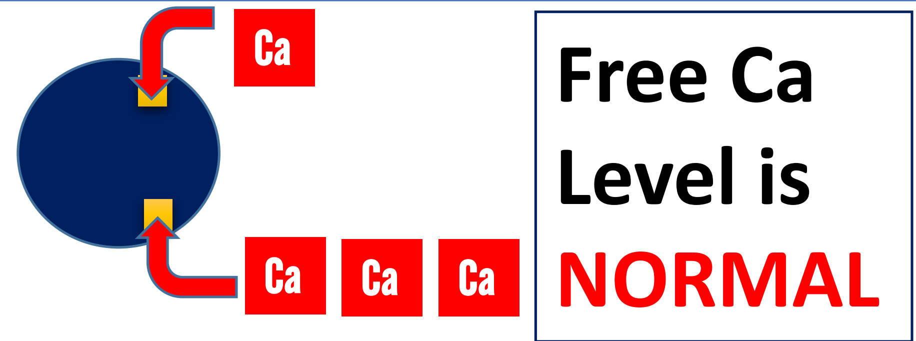
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Causes of Hypocalcaemia

❶ Law Serum Albumin



❷ PTG Dysfunction



❸ Vitamin D deficiency

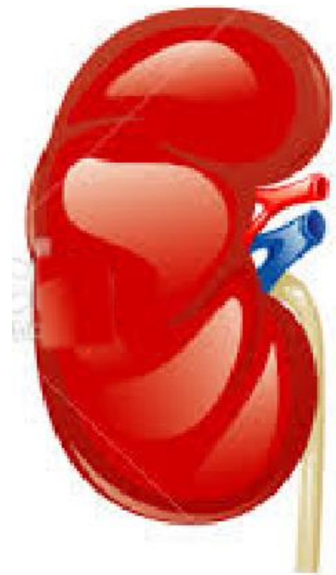


❹ Excessive Removal of Ca from Serum



Excessive Removal of Ca from Serum

↑ PO4



CRF

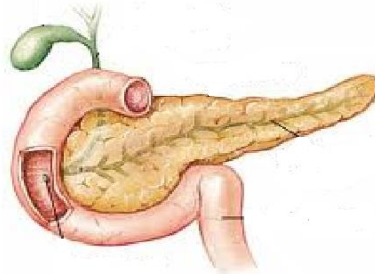
↑ Citrate



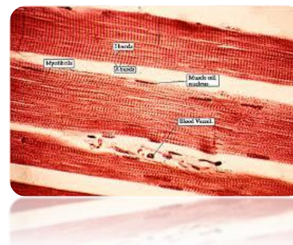
Excessive Blood Transfusion

Soft tissue Deposition

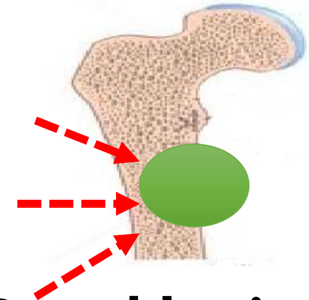
① Acute Pancreatitis



② Acute stage of Rhabdomyolysis



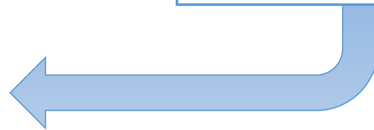
Bone

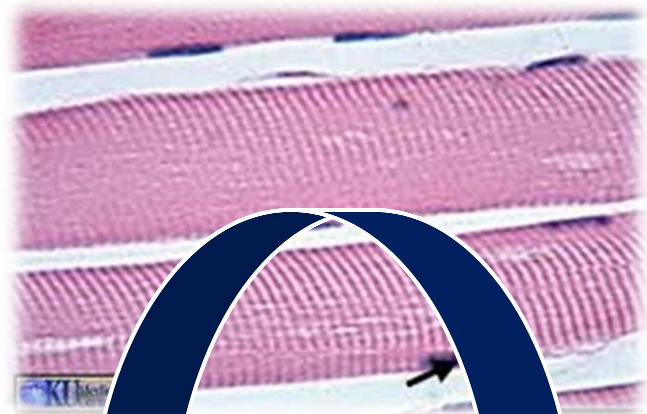


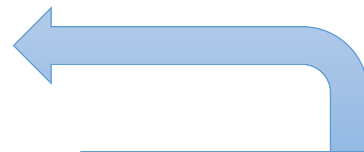
1- Osteoblastic Metastasis
2- Hungry Bone Syndrome

Rhabdomyolysis

Traumatic







Non-Traumatic

A Alcohol

B Polymyositis

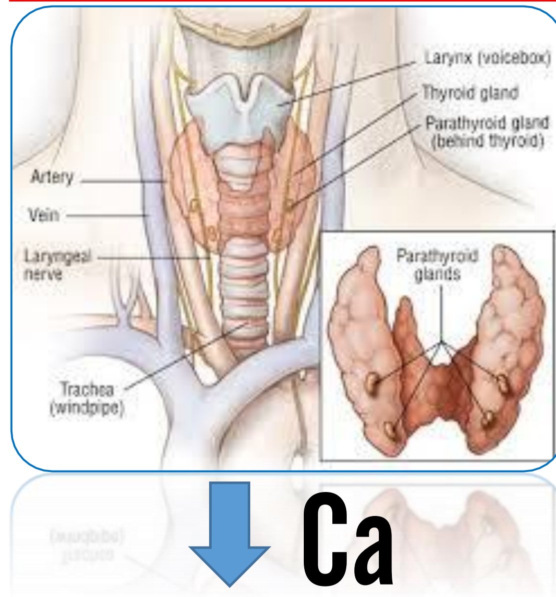
C Convulsions

↓Ca

↑Ca

Hungry Bone Syndrome

After the Removal of PTGs



↓ Ca

↓ PTH

Hungry Bone Syndrome

↑ PO4

↓ PO4